



SEQUENCE LISTING

<110> Griffith, Irwin J et al.

<120> T CELL EPITOPES OF RYEGRASS POLLEN ALLERGEN

<130> IMI-040CP3

<140> 08/737,904

<141> 1996-11-20

<150> 08/106,016

<151> 1993-08-13

<160> 60

<170> PatentIn Ver. 2.0

<210> 1

<211> 1229

<212> DNA

<213> Escherichia coli

<220>

<221> CDS

<222> (40)..(942)

<400> 1

cgctatccct ccctcgta aacaaacgca agagcagca atg gcc gtc cag aag 54
Met Ala Val Gln Lys
1 5

tac acg gtg gct cta ttc ctc gcc gtg gcc ctc gtg gcg ggc ccg gcc 102
Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Leu Val Ala Gly Pro Ala
10 15 20

gcc tcc tac gcc gct gac gcc ggc tac adc ccc gca gcc gcg gcc acc 150
Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Thr Pro Ala Ala Ala Thr
25 30 35

ccg gct act cct gct gcc acc ccg gct gcg gct gga ggg aag gcg acg 198
Pro Ala Thr Pro Ala Ala Thr Pro Ala Ala Ala Gly Gly Lys Ala Thr
40 45 50

acc gac gag cag aag ctg ctg gag gac gtc aac gct ggc ttc aag gca 246
Thr Asp Glu Gln Lys Leu Leu Glu Asp Val Asn Ala Gly Phe Lys Ala
55 60 65

gcc gtg gcc gcc gct gcc aac gcc cct ccg gcg gac aag ttc aag atc 294
Ala Val Ala Ala Ala Asn Ala Pro Pro Ala Asp Lys Phe Lys Ile
70 75 80 85

ttc gag gcc gcc ttc tcc gag tcc aag ggc ctc ctc gcc acc tcc 342
Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly Leu Leu Ala Thr Ser
90 95 100

gcc gcc aag gca ccc ggc ctc atc ccc aag ctc gac acc gcc tac gac 390

Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys Leu Asp Thr Ala Tyr Asp			
105	110	115	
gtc gcc tac aag gcc gcc gag ggc gcc acc ccc gag gcc aag tac gac			438
Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro Glu Ala Lys Tyr Asp			
120	125	130	
gcc ttc gtc act gcc ctc acc gaa gcg ctc cgc gtc atc gcc ggc gcc			486
Ala Phe Val Thr Ala Leu Thr Glu Ala Leu Arg Val Ile Ala Gly Ala			
135	140	145	
ctc gag gtc cac gcc gtc aag ccc gcc acc gag gag gtc cct gct gct			534
Leu Glu Val His Ala Val Lys Pro Ala Thr Glu Glu Val Pro Ala Ala			
150	155	160	165
aag atc ccc acc ggt gag ctg cag atc gtt gac aag atc gat gct gcc			582
Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp Lys Ile Asp Ala Ala			
170	175	180	
ttc aag atc gca gcc acc gcc aac gcc ccc acc aac gat aag			630
Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala Ala Pro Thr Asn Asp Lys			
185	190	195	
ttc acc gtc ttc gag agt gcc ttc aac aag gcc ctc aat gag tgc acg			678
Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala Leu Asn Glu Cys Thr			
200	205	210	
ggc ggc gcc tat gag acc tac aag ttc atc ccc tcc ctc gag gcc gcg			726
Gly Gly Ala Tyr Glu Thr Tyr Lys Phe Ile Pro Ser Leu Glu Ala Ala			
215	220	225	
gtc aag cag gcc tac gcc acc gtc gcc ggc ccc gag gtc aag			774
Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala Pro Glu Val Lys			
230	235	240	245
tac gcc gtc ttt gag gcc gcg ctg acc aag gcc atc acc gcc atg acc			822
Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met Thr			
250	255	260	
cag gca cag aag gcc ggc aaa ccc gct gcc gcc gct gcc aca ggc gcc			870
Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala Ala Ala Thr Gly Ala			
265	270	275	
gca acc gtt gcc acc ggc gcc gca acc gcc gcc gcc ggt gct gcc acc			918
Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala Ala Gly Ala Ala Thr			
280	285	290	
gcc gct gct ggt ggc tac aaa gcc tgatcagtt gctaatac tactgaacgt			972
Ala Ala Ala Gly Gly Tyr Lys Ala			
295	300		
atgtatgtgc atgatccggg cggcgagtgg ttttggat aattatctt cgtttcgtt			1032
tcatgcagcc gcgatcgaga gggcttgcatt gcttgtaata attcaatatt ttccatttct			1092
ttttgaatct gtaaatcccc atgacaagta gtggatcaa gtcggcatgt atcaccgtt			1152

atgcgagttt aacgatgggg agtttatcaa agaatttatt attaaaaaaa aaaaaaaaaa 1212
aaaaaaaaaa aaaaaaaa 1229

<210> 2
<211> 301
<212> PRT
<213> Escherichia coli

<400> 2
Met Ala Val Gln Lys Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Leu
1 5 10 15
Val Ala Gly Pro Ala Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Thr Pro
20 25 30
Ala Ala Ala Ala Thr Pro Ala Thr Pro Ala Ala Thr Pro Ala Ala Ala
35 40 45
Gly Gly Lys Ala Thr Thr Asp Glu Gln Lys Leu Leu Glu Asp Val Asn
50 55 60
Ala Gly Phe Lys Ala Ala Val Ala Ala Ala Asn Ala Pro Pro Ala
65 70 75 80
Asp Lys Phe Lys Ile Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly
85 90 95
Leu Leu Ala Thr Ser Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys Leu
100 105 110
Asp Thr Ala Tyr Asp Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro
115 120 125
Glu Ala Lys Tyr Asp Ala Phe Val Thr Ala Leu Thr Glu Ala Leu Arg
130 135 140
Val Ile Ala Gly Ala Leu Glu Val His Ala Val Lys Pro Ala Thr Glu
145 150 155 160
Glu Val Pro Ala Ala Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp
165 170 175
Lys Ile Asp Ala Ala Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala Ala
180 185 190
Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala
195 200 205
Leu Asn Glu Cys Thr Gly Gly Ala Tyr Glu Thr Tyr Lys Phe Ile Pro
210 215 220
Ser Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala
225 230 235 240
Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala

245

250

255

Ile Thr Ala Met Thr Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala Ala
260 265 270

Ala Ala Thr Gly Ala Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala
275 280 285

Ala Gly Ala Ala Thr Ala Ala Ala Gly Gly Tyr Lys Ala
290 295 300

<210> 3

<211> 20

<212> PRT

<213> Escherichia coli

<220>

<223> all occurrences of Xaa=hydroxyproline

<400> 3

Ala Asp Ala Gly Tyr Thr Xaa Ala Ala Ala Ala Thr Xaa Ala Thr Xaa
1 5 10 15

Ala Ala Thr Xaa
20

<210> 4

<211> 20

<212> PRT

<213> Escherichia coli

<220>

<223> all occurrences of Xaa=hydroxyproline

<400> 4

Ala Thr Xaa Ala Thr Pro Ala Ala Thr Xaa Ala Ala Ala Gly Gly Lys
1 5 10 15

Ala Thr Thr Asp
20

<210> 5

<211> 20

<212> PRT

<213> Escherichia coli

<220>

<223> all occurrences of Xaa =hydroxyproline

<400> 5

Ala Ala Ala Gly Gly Lys Ala Thr Thr Asp Glu Gln Lys Leu Leu Glu
1 5 10 15

Asp Val Asn Ala

<210> 6
<211> 20
<212> PRT
<213> Escherichia coli

<400> 6
Glu Gln Lys Leu Leu Glu Asp Val Asn Ala Gly Phe Lys Ala Ala Val
1 5 10 15
Ala Ala Ala Ala
20

<210> 7
<211> 16
<212> PRT
<213> Escherichia coli

<400> 7
Gly Phe Lys Ala Ala Val Ala Ala Ala Asn Ala Pro Pro Ala Asp
1 5 10 15

<210> 8
<211> 20
<212> PRT
<213> Escherichia coli

<400> 8
Asn Ala Pro Pro Ala Asp Lys Phe Lys Ile Phe Glu Ala Ala Phe Ser
1 5 10 15
Glu Ser Ser Lys
20

<210> 9
<211> 20
<212> PRT
<213> Escherichia coli

<400> 9
Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly Leu Leu Ala Thr Ser
1 5 10 15
Ala Ala Lys Ala
20

<210> 10
<211> 20
<212> PRT
<213> Escherichia coli

<400> 10

Gly Leu Leu Ala Thr Ser Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys
1 5 10 15

Leu Asp Thr Ala
20

<210> 11

<211> 20

<212> PRT

<213> Escherichia coli

<400> 11

Pro Gly Leu Ile Pro Lys Leu Asp Thr Ala Tyr Asp Val Ala Tyr Lys
1 5 10 15

Ala Ala Glu Gly
20

<210> 12

<211> 20

<212> PRT

<213> Escherichia coli

<400> 12

Tyr Asp Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro Glu Ala Lys
1 5 10 15

Tyr Asp Ala Phe
20

<210> 13

<211> 20

<212> PRT

<213> Escherichia coli

<400> 13

Ala Thr Pro Glu Ala Lys Tyr Asp Ala Phe Val Thr Ala Leu Thr Glu
1 5 10 15

Ala Leu Arg Val
20

<210> 14

<211> 20

<212> PRT

<213> Escherichia coli

<400> 14

Val Thr Ala Leu Thr Glu Ala Leu Arg Val Ile Ala Gly Ala Leu Glu
1 5 10 15

Val His Ala Val

<210> 15
<211> 20
<212> PRT
<213> Escherichia coli

<400> 15
Ile Ala Gly Ala Leu Glu Val His Ala Val Lys Pro Ala Thr Glu Glu
1 5 10 15
Val Pro Ala Ala
20

<210> 16
<211> 20
<212> PRT
<213> Escherichia coli

<400> 16
Lys Pro Ala Thr Glu Glu Val Pro Ala Ala Lys Ile Pro Thr Gly Glu
1 5 10 15
Leu Gln Ile Val
20

<210> 17
<211> 20
<212> PRT
<213> Escherichia coli

<400> 17
Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp Lys Ile Asp Ala Ala
1 5 10 15
Phe Lys Ile Ala
20

<210> 18
<211> 20
<212> PRT
<213> Escherichia coli

<400> 18
Asp Lys Ile Asp Ala Ala Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala
1 5 10 15
Ala Pro Thr Asn
20

<210> 19
<211> 20

<212> PRT

<213> Escherichia coli

<400> 19

Ala Thr Ala Ala Asn Ala Ala Pro Thr Asn Asp Lys Phe Thr Val Phe
1 5 10 15

Glu Ser Ala Phe
20

<210> 20

<211> 20

<212> PRT

<213> Escherichia coli

<400> 20

Asp Lys Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala Leu Asn Glu
1 5 10 15

Cys Thr Gly Gly
20

<210> 21

<211> 20

<212> PRT

<213> Escherichia coli

<400> 21

Asn Lys Ala Leu Asn Glu Cys Thr Gly Gly Ala Tyr Glu Thr Tyr Lys
1 5 10 15

Phe Ile Pro Ser
20

<210> 22

<211> 20

<212> PRT

<213> Escherichia coli

<400> 22

Ala Tyr Glu Thr Tyr Lys Phe Ile Pro Ser Leu Glu Ala Ala Val Lys
1 5 10 15

Gln Ala Tyr Ala
20

<210> 23

<211> 20

<212> PRT

<213> Escherichia coli

<400> 23

Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala

1	5	10	15
Pro Glu Val Lys			
20			
<210> 24			
<211> 20			
<212> PRT			
<213> Escherichia coli			
<400> 24			
Ala Thr Val Ala Ala Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Ala			
1	5	10	15
Ala Leu Thr Lys			
20			
<210> 25			
<211> 20			
<212> PRT			
<213> Escherichia coli			
<400> 25			
Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met Thr			
1	5	10	15
Gln Ala Gln Lys			
20			
<210> 26			
<211> 20			
<212> PRT			
<213> Escherichia coli			
<400> 26			
Ala Ile Thr Ala Met Thr Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala			
1	5	10	15
Ala Ala Ala Thr			
20			
<210> 27			
<211> 20			
<212> PRT			
<213> Escherichia coli			
<400> 27			
Ala Gly Lys Pro Ala Ala Ala Ala Thr Gly Ala Ala Thr Val Ala			
1	5	10	15
Thr Gly Ala Ala			
20			

<210> 28
<211> 20
<212> PRT
<213> Escherichia coli

<400> 28
Gly Ala Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala Ala Gly Ala
1 5 10 15
Ala Thr Ala Ala
20

<210> 29
<211> 16
<212> PRT
<213> Escherichia coli

<400> 29
Thr Ala Ala Ala Gly Ala Ala Thr Ala Ala Ala Gly Gly Tyr Lys Ala
1 5 10 15

<210> 30
<211> 20
<212> PRT
<213> Escherichia coli

<400> 30
Ile Ala Lys Val Pro Pro Gly Pro Asn Ile Thr Ala Glu Tyr Gly Asp
1 5 10 15

Lys Trp Leu Asp
20

<210> 31
<211> 20
<212> PRT
<213> Escherichia coli

<400> 31
Ile Ala Lys Val Xaa Pro Gly Xaa Asn Ile Thr Ala Glu Tyr Gly Asp
1 5 10 15

Lys Trp Leu Asp
20

<210> 32
<211> 20
<212> PRT
<213> Escherichia coli

<400> 32
Thr Ala Glu Tyr Gly Asp Lys Trp Leu Asp Ala Lys Ser Thr Trp Tyr

1	5	10	15
Gly Lys Pro Thr			
20			
<210> 33			
<211> 20			
<212> PRT			
<213> Escherichia coli			
<400> 33			
Gly Ala Gly Pro Lys Asp Asn Gly Gly Ala Cys Gly Tyr Lys Asn Val			
1	5	10	15
Asp Lys Ala Pro			
20			
<210> 34			
<211> 20			
<212> PRT			
<213> Escherichia coli			
<400> 34			
Gly Ala Gly Pro Lys Asp Asn Gly Gly Ala Cys Gly Tyr Lys Asp Val			
1	5	10	15
Asp Lys Ala Pro			
20			
<210> 35			
<211> 20			
<212> PRT			
<213> Escherichia coli			
<400> 35			
Cys Gly Tyr Lys Asp Val Asp Lys Ala Pro Phe Asn Gly Met Thr Gly			
1	5	10	15
Cys Gly Asn Thr			
20			
<210> 36			
<211> 22			
<212> PRT			
<213> Escherichia coli			
<400> 36			
Cys Gly Phe Asn Gly Met Thr Gly Cys Gly Asn Thr Pro Ile Phe Lys			
1	5	10	15
Asp Gly Arg Gly Cys Gly			
20			

<210> 37
<211> 20
<212> PRT
<213> Escherichia coli

<400> 37
Pro Ile Phe Lys Asp Gly Arg Gly Cys Gly Ser Cys Phe Glu Ile Lys
1 5 10 15
Cys Thr Lys Pro
20

<210> 38
<211> 20
<212> PRT
<213> Escherichia coli

<400> 38
Ser Cys Phe Glu Ile Lys Cys Thr Lys Pro Glu Ser Cys Ser Gly Glu
1 5 10 15
Ala Val Thr Val
20

<210> 39
<211> 20
<212> PRT
<213> Escherichia coli

<400> 39
Glu Ser Cys Ser Gly Glu Ala Val Thr Val Thr Ile Thr Asp Asp Asn
1 5 10 15
Glu Glu Pro Ile
20

<210> 40
<211> 20
<212> PRT
<213> Escherichia coli

<400> 40
Thr Ile Thr Asp Asp Asn Glu Glu Pro Ile Ala Pro Tyr His Phe Asp
1 5 10 15
Leu Ser Gly His
20

<210> 41
<211> 20
<212> PRT
<213> Escherichia coli

<400> 41
Ala Pro Tyr His Phe Asp Leu Ser Gly His Ala Phe Gly Ser Met Ala
1 5 10 15

Asp Asp Gly Glu
20

<210> 42
<211> 20
<212> PRT
<213> Escherichia coli

<400> 42
Ala Phe Gly Ser Met Ala Asp Asp Gly Glu Glu Gln Lys Leu Arg Ser
1 5 10 15

Ala Gly Glu Leu
20

<210> 43
<211> 20
<212> PRT
<213> Escherichia coli

<400> 43
Glu Gln Lys Leu Arg Ser Ala Gly Glu Leu Glu Leu Gln Phe Arg Arg
1 5 10 15

Val Lys Cys Lys
20

<210> 44
<211> 20
<212> PRT
<213> Escherichia coli

<400> 44
Glu Leu Gln Phe Arg Arg Val Lys Cys Lys Tyr Pro Asp Asp Thr Lys
1 5 10 15

Pro Thr Phe His
20

<210> 45
<211> 20
<212> PRT
<213> Escherichia coli

<400> 45
Tyr Pro Asp Asp Thr Lys Pro Thr Phe His Val Glu Lys Ala Ser Asn
1 5 10 15

Pro Asn Tyr Leu
20

<210> 46
<211> 20
<212> PRT
<213> Escherichia coli

<400> 46
Val Glu Lys Ala Ser Asn Pro Asn Tyr Leu Ala Ile Leu Val Lys Tyr
1 5 10 15

Val Asp Gly Asp
20

<210> 47
<211> 20
<212> PRT
<213> Escherichia coli

<400> 47
Val Glu Lys Gly Ser Asn Pro Asn Tyr Leu Ala Ile Leu Val Lys Tyr
1 5 10 15

Val Asp Gly Asp
20

<210> 48
<211> 20
<212> PRT
<213> Escherichia coli

<400> 48
Ala Ile Leu Val Lys Tyr Val Asp Gly Asp Gly Asp Val Val Ala Val
1 5 10 15

Asp Ile Lys Glu
20

<210> 49
<211> 20
<212> PRT
<213> Escherichia coli

<400> 49
Gly Asp Val Val Ala Val Asp Ile Lys Glu Lys Gly Lys Asp Lys Trp
1 5 10 15

Ile Glu Leu Lys
20

<210> 50

<211> 20
<212> PRT
<213> Escherichia coli

<400> 50
Lys Gly Lys Asp Lys Trp Ile Glu Leu Lys Glu Ser Trp Gly Ala Val
1 5 10 15

Trp Arg Ile Asp
20

<210> 51
<211> 20
<212> PRT
<213> Escherichia coli

<400> 51
Thr Pro Asp Lys Leu Thr Gly Pro Phe Thr Val Arg Tyr Thr Thr Glu
1 5 10 15

Gly Gly Thr Lys
20

<210> 52
<211> 20
<212> PRT
<213> Escherichia coli

<400> 52
Val Arg Tyr Thr Thr Glu Gly Gly Thr Lys Ser Glu Val Glu Asp Val
1 5 10 15

Ile Pro Glu Gly
20

<210> 53
<211> 20
<212> PRT
<213> Escherichia coli

<400> 53
Ser Glu Val Glu Asp Val Ile Pro Glu Gly Trp Lys Ala Asp Thr Ser
1 5 10 15

Tyr Ser Ala Lys
20

<210> 54
<211> 33
<212> PRT
<213> Escherichia coli

<220>

<223> all occurrences of Xaa=hydroxyproline

<400> 54

Ala Asp Ala Gly Tyr Thr Xaa Ala Ala Ala Ala Thr Xaa Ala Thr Xaa
1 5 10 15

Ala Ala Thr Xaa Ala Ala Gly Gly Lys Ala Thr Thr Asp Glu Gln
20 25 30

Lys

<210> 55

<211> 20

<212> PRT

<213> Escherichia coli

<400> 55

Ala Lys Ser Thr Trp Tyr Gly Lys Pro Thr Gly Ala Gly Pro Lys Asp
1 5 10 15

Asn Gly Gly Ala
20

<210> 56

<211> 20

<212> PRT

<213> Escherichia coli

<400> 56

Glu Ser Trp Gly Ala Val Trp Arg Ile Asp Thr Pro Asp Lys Leu Thr
1 5 10 15

Gly Pro Phe Thr
20

<210> 57

<211> 1181

<212> DNA

<213> Escherichia coli

<220>

<221> CDS

<222> (53)..(961)

<220>

<221> mat_peptide

<222> (125)

<400> 57

gaattcgagg atccgggtac catggctccg acaaaccaac gcaagagcag ca atg gca 58
Met Ala

gtg cag cag tac acg gtg gcg ctg ttc ctg gcc gtg gcc tcg tgt cgg 106

Val Gln Gln Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Ser Cys Arg						
-20	-15	-10				
gcc cgc gcc tcc tac gcc gac gcc ggc tac gcc ccc gcc act ccc						154
Ala Arg Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Ala Pro Ala Thr Pro						
-5	-1	1	5	10		
gcc acc ccg gct acc ccc gcg gcc cca ggc gca gcg gtg cca gca ggg						202
Ala Thr Pro Ala Thr Pro Ala Ala Pro Gly Ala Ala Val Pro Ala Gly						
15	20	25				
aag gcg gcg acc gag gag cag aag ctg atc gag aag atc aac gcc ggc						250
Lys Ala Ala Thr Glu Glu Gln Lys Leu Ile Glu Lys Ile Asn Ala Gly						
30	35	40				
ttc aag gcc gcc gtg gcg gcc gcg ggc gtc ccg cca ggc gac aag						298
Phe Lys Ala Ala Val Ala Ala Ala Gly Val Pro Pro Gly Asp Lys						
45	50	55				
tac aag acg ttc gtc gaa acc ttc ggc aag gcc tcc aac aag gcc ttc						346
Tyr Lys Thr Phe Val Glu Thr Phe Gly Lys Ala Ser Asn Lys Ala Phe						
60	65	70				
ctg ggg gac ctc ccg acc aac tac gcc gat gtc aac tcc agg gcc cag						394
Leu Gly Asp Leu Pro Thr Asn Tyr Ala Asp Val Asn Ser Arg Ala Gln						
75	80	85	90			
ctc acc tcg aag ctc gac gcc gac tac aag ctc gcc tac gac gcc gcc						442
Leu Thr Ser Lys Leu Asp Ala Ala Tyr Lys Leu Ala Tyr Asp Ala Ala						
95	100	105				
cag ggc gcc acc ccc gag gcc aag tac gac gcc tac gtc gcc acc ctc						490
Gln Gly Ala Thr Pro Glu Ala Lys Tyr Asp Ala Tyr Val Ala Thr Leu						
110	115	120				
agc gag gcg ctc cgc atc atc gcc ggc acc ctc gag gtc cac gcc gtc						538
Ser Glu Ala Leu Arg Ile Ile Ala Gly Thr Leu Glu Val His Ala Val						
125	130	135				
aag ccc gct gcc gag gag gtc aag cct atc ccc gcc gga gag ctg cag						586
Lys Pro Ala Ala Glu Glu Val Lys Pro Ile Pro Ala Gly Glu Leu Gln						
140	145	150				
atc gtc gac aag att gac gtc gcc ttc aga act gcc gcc acc gcc gcc						634
Ile Val Asp Lys Ile Asp Val Ala Phe Arg Thr Ala Ala Thr Ala Ala						
155	160	165	170			
aac gcc gcc ccc acc aac gac aag ttc acc gta ttc gag acc acc ttt						682
Asn Ala Ala Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Thr Thr Phe						
175	180	185				
aac aag gcc atc aag gag agc acg ggc ggc acc tac gag agc tac aag						730
Asn Lys Ala Ile Lys Glu Ser Thr Gly Gly Thr Tyr Glu Ser Tyr Lys						
190	195	200				
ttc att ccc acc ctt gag gcc gtc aag cag gcc tac gcc gcc acc						778
Phe Ile Pro Thr Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr						

205

210

215

gtc gca tcc gcg ccg gag gtc aag tac gcc gtc ttt gag acc gcg ctg 826
 Val Ala Ser Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Thr Ala Leu
 220 225 230

aaa aag gcg gtc acc gcc atg tcc gag gcc cag aag gaa gcc aag ccc 874
 Lys Lys Ala Val Thr Ala Met Ser Glu Ala Gln Lys Glu Ala Lys Pro
 235 240 245 250

gcc acc gcc acc ccg acc ccc acc gca act gcc gcg gcc gcg gtg gcc 922
 Ala Thr Ala Thr Pro Thr Pro Thr Ala Ala Ala Ala Val Ala
 255 260 265

acc aac gcc gcc ccc gtc gct gct ggt ggc tac aaa atc tgatcaactc 971
 Thr Asn Ala Ala Pro Val Ala Ala Gly Gly Tyr Lys Ile
 270 275

gctagcaata tacacatcca tcatgcacat atagagctgt gtatgtatgt gcatgcacgc 1031
 cgtggcgccg cgcaagttt ctcataatta attctgggtt ttcgttgctt gcatccacga 1091
 gcgaccgagc ccgtggatag tcgcacatgtgt atgtaatttt ttctgagaaa tgtgtatatg 1151
 taatatataa ttgagttacta aaaaaaaaaaa 1181

<210> 58

<211> 303

<212> PRT

<213> Escherichia coli

<400> 58

Met Ala Val Gln Gln Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Ser
 -20 -15 -10

Cys Arg Ala Arg Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Ala Pro Ala
 -5 -1 1 5

Thr Pro Ala Thr Pro Ala Thr Pro Ala Ala Pro Gly Ala Ala Val Pro
 10 15 20

Ala Gly Lys Ala Ala Thr Glu Glu Gln Lys Leu Ile Glu Lys Ile Asn
 25 30 35 40

Ala Gly Phe Lys Ala Ala Val Ala Ala Ala Gly Val Pro Pro Gly
 45 50 55

Asp Lys Tyr Lys Thr Phe Val Glu Thr Phe Gly Lys Ala Ser Asn Lys
 60 65 70

Ala Phe Leu Gly Asp Leu Pro Thr Asn Tyr Ala Asp Val Asn Ser Arg
 75 80 85

Ala Gln Leu Thr Ser Lys Leu Asp Ala Ala Tyr Lys Leu Ala Tyr Asp
 90 95 100

Ala Ala Gln Gly Ala Thr Pro Glu Ala Lys Tyr Asp Ala Tyr Val Ala
105 110 115 120

Thr Leu Ser Glu Ala Leu Arg Ile Ile Ala Gly Thr Leu Glu Val His
125 130 135

Ala Val Lys Pro Ala Ala Glu Glu Val Lys Pro Ile Pro Ala Gly Glu
140 145 150

Leu Gln Ile Val Asp Lys Ile Asp Val Ala Phe Arg Thr Ala Ala Thr
155 160 165

Ala Ala Asn Ala Ala Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Thr
170 175 180

Thr Phe Asn Lys Ala Ile Lys Glu Ser Thr Gly Gly Thr Tyr Glu Ser
185 190 195 200

Tyr Lys Phe Ile Pro Thr Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala
205 210 215

Ala Thr Val Ala Ser Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Thr
220 225 230

Ala Leu Lys Lys Ala Val Thr Ala Met Ser Glu Ala Gln Lys Glu Ala
235 240 245

Lys Pro Ala Thr Ala Thr Pro Thr Pro Thr Ala Thr Ala Ala Ala Ala
250 255 260

Val Ala Thr Asn Ala Ala Pro Val Ala Ala Gly Gly Tyr Lys Ile
265 270 275

<210> 59

<211> 20

<212> PRT

<213> Escherichia coli

<220>

<223> all occurrences of Xaa=hydroxyproline

<400> 59

Ala Asp Ala Gly Tyr Thr Xaa Ala Ala Ala Ala Thr Xaa Ala Thr Xaa
1 5 10 15

Ala Ala Thr Xaa

20

<210> 60

<211> 20

<212> PRT

<213> Escherichia coli

<220>

<223> all occurrences of Xaa=hydroxyproline

<400> 60

Ala Thr Xaa Ala Thr Xaa Ala Ala Thr Xaa Ala Ala Ala Gly Gly Lys
1 5 10 15

Ala Thr Thr Asp
20